UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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			EXAMINER
29989	7590	04/04/2006	SETLAK, ANDREW T

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ART UNIT	PAPER NUMBER
2166	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/643,629	LI ET AL.
	Examiner	Art Unit	
	Andrew Setlak	2166	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 August 2003*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date *10/5/04-1/27/06*.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Claim Objections

A series of singular dependent claims is permissible in which a dependent claim refers to a preceding claim which, in turn, refers to another preceding claim.

A claim which depends from a dependent claim should not be separated by any claim which does not also depend from said dependent claim. It should be kept in mind that a dependent claim may refer to any preceding independent claim. In general, applicant's sequence will not be changed. See MPEP § 608.01(n).

Applicant is reminded that in order for claims 11-20 to be in proper dependant form claim numbering conventions should be observed. As presented it appears as though each of claims 11-20 are written in independent form. It is clear from the fee worksheet however, that this was not the intention of the applicant.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 1-20 do not appear to produce a useful, concrete *and* tangible result. The examiner does not see either the practical application required in order to meet the useful requirement of the result of a claim as required under 35 U.S.C. § 101 nor the tangible result aspect embodied in claims 1-20.

Further, if the "acts" of a claimed process manipulate only numbers, abstract concepts or ideas, or signals representing any of the foregoing, the acts are not being applied to appropriate subject matter. Benson, 409 U.S. at 71-72, 175 USPQ at 676. Thus, a process consisting solely of mathematical operations, i.e., converting one set of numbers into another set of numbers, does not manipulate appropriate subject matter and thus cannot constitute a statutory process.

Further, claims 11-20 appear to encompass transmission media within their scope as evidenced by ¶ 143-145 of the specification. Thus, claims 11-20 are also rejected under 35 U.S.C. §101 as being directed to the non-statutory area of signals embodied on a transmission medium.

Claims that recite nothing but the physical characteristics of a form of energy, such as a frequency, voltage, or the strength of a magnetic field, define energy or magnetism, per se, and as such are nonstatutory natural phenomena. O'Reilly, 56 U.S. (15 How.) at 112-14. Moreover, it does not appear that a claim reciting a signal encoded with functional descriptive material falls within any of the categories of patentable subject matter set forth in § 101.

First, a claimed signal is clearly not a "process" under § 101 because it is not a series of steps. The other three § 101 classes of machine, compositions of matter and manufactures "relate to structural entities and can be grouped as 'product' claims in order to contrast them with process claims." 1 D. Chisum, Patents § 1.02 (1994). The three product classes have traditionally required physical structure or material.

"The term machine includes every mechanical device or combination of

mechanical device or combination of mechanical powers and devices to perform some

function and produce a certain effect or result." Corning v. Burden, 56 U.S. (15 How.)

252, 267 (1854). A modern definition of machine would no doubt include electronic

devices which perform functions. Indeed, devices such as flip-flops and computers are

referred to in computer science as sequential machines. A claimed signal has no

physical structure, does not itself perform any useful, concrete and tangible result and,

thus, does not fit within the definition of a machine.

A "composition of matter" "covers all compositions of two or more substances

and includes all composite articles, whether they be results of chemical union, or of

mechanical mixture, or whether they be gases, fluids, powders or solids." Shell

Development Co. v. Watson, 149 F. Supp. 279, 280, 113 USPQ 265, 266 (D.D.C.

1957), aff'd, 252 F.2d 861, 116 USPQ 428 (D.C. Cir. 1958). A claimed signal is not

matter, but a form of energy, and therefore is not a composition of matter.

The Supreme Court has read the term "manufacture" in accordance with its

dictionary definition to mean "the production of articles for use from raw or prepared

materials by giving to these materials new forms, qualities, properties, or combinations,

whether by hand-labor or by machinery." Diamond v. Chakrabarty, 447 U.S. 303, 308,

206 USPQ 193, 196-97 (1980) (quoting American Fruit Growers, Inc. v. Brogdex Co.,

283 U.S. 1, 11, 8 USPQ 131, 133 (1931), which, in turn, quotes the Century Dictionary).

Other courts have applied similar definitions. See American Disappearing Bed Co. v.

Arnaelsteen, 182 F. 324, 325 (9th Cir. 1910), cert. denied, 220 U.S. 622 (1911). These

definitions require physical substance, which a claimed signal does not have. Congress

can be presumed to be aware of an administrative or judicial interpretation of a statute

and to adopt that interpretation when it re-enacts a statute without change. Lorillard v.

Pons, 434 U.S. 575, 580 (1978). Thus, Congress must be presumed to have been

aware of the interpretation of manufacture in American Fruit Growers when it passed

the 1952 Patent Act.

A manufacture is also defined as the residual class of product. 1 Chisum, §

1.02[3] (citing W. Robinson, The Law of Patents for Useful Inventions 270 (1890)).

A product is a tangible physical article or object, some form of matter, which a signal is

not. That the other two product classes, machine and composition of matter, require

physical matter is evidence that a manufacture was also intended to require physical

matter. A signal, a form of energy, does not fall within either of the two definitions of

manufacture. Thus, a signal does not fall within one of the four statutory classes of §

101.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4 & 11-14 are rejected under 35 U.S.C. 102(b) as being anticipated by

U.S. Patent No. 6,324,533 (henceforth referred to as Agrawal et al.).

Claim 1 is anticipated by the well-known apriori method as disclosed by Agrawal et al. as follows: **A method for performing a frequent itemset operation, the method comprising the steps of: performing the frequent itemset operation in a plurality of phases, wherein each phase is associated with combinations that have a particular number of items (C5:L32-34); during at least one phase of the plurality of phases, performing the steps of determining candidate combinations that are to be evaluated during the phase (C5:L37-41); grouping the candidate combinations into clusters based on which items are included in said candidate combinations (C5:L41-47); and processing said candidate combinations, based on said clusters, to determine whether the candidate combinations satisfy a frequency criteria associated with said frequent itemset operation (C5:L47-50).**

Claim 2 is anticipated by Agrawal et al. as in claim 1, **wherein the step of grouping the candidate combinations into clusters includes the step of establishing an ordering for said candidate combinations by sorting the candidate combinations relative to each other based on the items within each of the candidate combinations** (figure 7 step 71; C6:L67-C7:L1, a lexicographical ordering will ensure that the subsets are ordered by the item names included in the subset).

Claim 3 is anticipated by Agrawal et al. as in claim 2, **wherein the step of processing the candidate combinations based on the clusters includes processing the candidate combinations in a sequence based on said ordering** (C7:L4-14).

Claim 4 is anticipated by Agrawal et al. as in claim 1, **wherein the step of grouping the candidate combinations into clusters includes hashing the candidate combinations into buckets based on the items that the candidate combination contain** (C12:L48-55; C13:L13-22).

Claims 11-14 are anticipated by Agrawal et al. using the same rationale as applied to claims 5-10.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5-10 & 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Agrawal et al. and the paper *High Performance Mining of Maximal Frequent Itemsets* written by Gösta Grahne and Jianfei Zhu (henceforth referred to as Grahne & Zhu).

Claim 5 is taught by Agrawal et al. as in claim 1. However, Agrawal et al. does not explicitly indicate that **the step of processing the candidate combinations includes generating bitmaps for the candidate combinations, and determining how many item groups of an item group population include each candidate combination based on the bitmap for the candidate combination.** Yet, Grahne & Zhu teaches **the step of processing the candidate combinations includes**

generating bitmaps for the candidate combinations, and determining how many

item groups of an item group population include each candidate combination

based on the bitmap for the candidate combination (Grahne & Zhu: figure 1(a);

pages 1-2, § 1 Introduction, ¶ 4 & 5).

One of ordinary skill in the art at the time of invention would have recognized that

the methods disclosed in Grahne & Zhu comprise the details of a subset of the method

taught by Agrawal et al. It would have been obvious to one of ordinary skill in the art at

the time of invention to have combined the teachings of Agrawal et al. and Grahne &

Zhu because they are both focused on knowledge within the domain of data mining.

Specifically, Grahne & Zhu state on page 10 § 4 ¶ 1 that their "paper studies the

performance of algorithms for mining frequent itemsets," which would clearly be of

importance to the frequent itemset mining stage of the association rule mining method

of Agrawal et al. Thus, it would have been obvious to one of ordinary skill in the art at

the time of invention to have combined the teachings of Agrawal et al. and Grahne &

Zhu.

Claim 6 is taught by the combination of Agrawal et al. and Grahne & Zhu as in

claim 5, **wherein the step of processing the candidate combinations includes, for**

each cluster, performing the steps of: generating a bitmap for a particular

combination that is a subcombination of all combinations in the cluster (Grahne &

Zhu: page 2, § 1 Introduction ¶ 5); **using the bitmap for the particular combination**

to generate bitmaps for all combinations in the cluster (Grahne & Zhu: page 2, § 1

Introduction ¶ 5); **using the bitmap generated for each combination in the cluster to**

determine how many item groups include the combination (Grahne & Zhu: page 2,

§ 1 Introduction ¶ 5); **and after all combinations in the cluster have been**

processed, discarding from volatile memory the bitmap for the particular

combination (it would have been notoriously obvious to one of ordinary skill in the art

at the time of invention to free the memory once the bitmaps are no longer needed).

Claim 7 is taught by Agrawal et al. as in claim 1. However, Agrawal et al. does

not explicitly indicate **the step of processing the candidate combinations includes**

generating bitmaps for the candidate combinations as the candidate

combinations are processed in a sequence, the method further comprising the

steps of: generating one or more intermediary bitmaps for use in generating of a

bitmap for a current candidate combination; and after generating the bitmap for

the current candidate combination, retaining in volatile memory only those

intermediary bitmaps that are base bitmaps of a next candidate combination in

said sequence; and if any intermediate bitmaps are retained, then using one or

more of the intermediary bitmaps to generate a bitmap for the next candidate

combination in said sequence. Yet, Grahne & Zhu teaches **the step of processing**

the candidate combinations includes generating bitmaps for the candidate

combinations as the candidate combinations are processed in a sequence, the

method further comprising the steps of: generating one or more intermediary

bitmaps for use in generating of a bitmap for a current candidate combination

(Grahne & Zhu: page 2, § 1 Introduction ¶ 5); **and after generating the bitmap for the**

current candidate combination, retaining in volatile memory only those

intermediary bitmaps that are base bitmaps of a next candidate combination in

said sequence (Grahne & Zhu: page 1, § 1 Introduction ¶ 3); **and if any intermediate**

bitmaps are retained, then using one or more of the intermediary bitmaps to

generate a bitmap for the next candidate combination in said sequence (Grahne &

Zhu: page 2, § 1 Introduction ¶ 5).

Claim 8 is taught by Agrawal et al. as follows: **A method for performing a**

frequent itemset operation, the method comprising the steps of: performing the

frequent itemset operation in a plurality of phases, wherein each phase is

associated with combinations that have a particular number of items (Agrawal et

al.: C5:L32-34); **during at least one phase of the plurality of phases, performing**

the steps of determining candidate combinations that are to be evaluated during

the phase (C5:L37-41); **processing said candidate combinations to determine**

whether the candidate combinations satisfy a frequency criteria associated with

said frequent itemset operation, wherein the step of processing the candidate

combinations includes generating bitmaps for the candidate combinations

(C5:L47-50). However, Agrawal et al. does not explicitly indicate **using an index on**

non-volatile memory to store a set of bitmaps that are generated during said at

least one phase; and during a subsequent phase of said plurality of phases,

performing the steps of retrieving bitmaps from said index into volatile memory;

and using the bitmaps retrieved from said index to generate bitmaps for

candidate combinations of said subsequent phase. Yet, Grahne & Zhu teaches

processing said candidate combinations to determine whether the candidate

combinations satisfy a frequency criteria associated with said frequent itemset operation, wherein the step of processing the candidate combinations includes generating bitmaps for the candidate combinations (Grahne & Zhu: page 2, § 1 Introduction ¶ 5); **and using an index on non-volatile memory to store a set of bitmaps that are generated during said at least one phase** (Grahne & Zhu: page 2, § 1 Introduction ¶ 5); **and during a subsequent phase of said plurality of phases, performing the steps of retrieving bitmaps from said index into volatile memory** (Grahne & Zhu: page 2, § 1 Introduction ¶ 5); **and using the bitmaps retrieved from said index to generate bitmaps for candidate combinations of said subsequent phase** (Grahne & Zhu: page 2, § 1 Introduction ¶ 5).

One of ordinary skill in the art at the time of invention would have recognized that the methods disclosed in Grahne & Zhu comprise the details of a subset of the method taught by Agrawal et al. It would have been obvious to one of ordinary skill in the art at the time of invention to have combined the teachings of Agrawal et al. and Grahne & Zhu because they are both focused on knowledge within the domain of data mining. Specifically, Grahne & Zhu state on page 10 § 4 ¶ 1 that their "paper studies the performance of algorithms for mining frequent itemsets," which would clearly be of importance to the frequent itemset mining stage of the association rule mining method of Agrawal et al. Thus, it would have been obvious to one of ordinary skill in the art at the time of invention to have combined the teachings of Agrawal et al. and Grahne & Zhu.

Claim 9 is taught by the combination of Agrawal et al. and Grahne & Zhu as in

claim 8, **wherein the step of using an index on non-volatile memory to store a set**

of bitmaps includes using an index that uses the combination associated with a

bitmap as an index key for determining where within the index to place an entry

for the bitmap (Grahne & Zhu: page 3, § 2.1 FP-Tree and FP-Growth method, ¶ 5).

Claim 10 is taught by the combination of Agrawal et al. and Grahne & Zhu as in

claim 8, **wherein: the at least one phase is a phase associated with N-item**

combinations (Grahne & Zhu: figure 1(b), phase one includes all N=1 itemsets; page 2,

§ 1 Introduction, ¶ 5); **and the set of bitmaps includes bitmaps associated with all**

N-item combinations that satisfy the frequency criteria (Grahne & Zhu: figure 1(a);

page 2, § 1 Introduction, ¶ 5).

Claims 15-20 are taught by the combination of Agrawal et al. and Grahne & Zhu

using the same rationale as applied to claims 5-10.

Information Disclosure Statement

Applicants' Information Disclosure Statements, filed on 1/27/2006, 10/17/2005,

8/17/2005, 1/4/2005, 12/2/2004, 10/22/2004, 10/8/2004 & 10/5/2004 have been

received, entered into the record, and considered. See attached PTO-1449 forms.

Conclusion

The prior art made record of on form PTO-892 and not relied upon is considered

pertinent to the applicants' disclosure.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Setlak whose telephone number is (571) 272-4060. The examiner can normally be reached on M-F 10:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hosain Alam can be reached on (571) 272-3978. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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03/29/2006

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